of whom only two are men of known scientific attainments, the others being but scientific amateurs. Even in the details of these experiments, we find that Dr. Huggins feels himself obliged to confess that the most startling phenomenon of all was *not* witnessed by him, although, of course, he has no doubt that it was seen as described by Mr. Crookes.

The experiments are but two in number; but in them, such is the peculiar nature of this "psychic" force as it manifests itself through the agency of Mr. Home (of spiritual and mediumistic reputation), that there is hardly any known law in Physical and Biological Science which it does not tend to overthrow. Fortunately, however, in the interest of Science and the true bearing of modern scientific education, this force but rarely manifests itself, and it is particularly disobliging when many scientific sceptics wish to investigate it.* Work is done without apparently any force, mental or physical, being used up, so that we have here the direct creation of force—bodies ordinarily susceptible to the action of gravity are seen freely suspended in the air—a musical instrument (a wind instrument ordinarily played by keys), is suddenly imbued with so great a love and accurate knowledge of music that whilst the keys are visibly not touched, it plays "a well-known sad and plaintive melody, and, moreover, executes it perfectly in a very beautiful manner." All these and other phenomena, so varied, so thrilling, so "psychic," we are solemnly informed took place one evening in a room of which the temperature varied from 68° to 70° F. !

To most scientific men I am afraid there will appear something in the above so absurd and ludicrous, something so allied to the performances of professed jugglers and spiritual mediums, that it would not be worth any serious consideration, did not the scientific reputation of Mr. Crookes and Dr. Huggins demand that the experiments which gave the above results should be at once disproved or confirmed. If we proceed to examine these experiments carefully, and rigidly investigate them, we find, however, a complete want of attention to minute but by no means unimportant details—a complete absence of any attempt to ascertain whether it was not possible to produce these results without any "psychic force," and a firm confidence and belief in the ingenuousness (I had almost unwittingly written "ingenuity") of Mr. Home.

Let us now examine the experiments in detail. Firstly, with regard to the accordion, we are not told why the cage was constructed at all, and why, moreover, when constructed it was placed *under a dining-room table* of all places in the world. Does Mr. Crookes wish us to believe that it is only inside such wooden cages and in such peculiar positions that this "psychic force" manifests itself? If that is not the case, why was not the cage placed openly in the room, so that Dr. Huggins might not have had to confess that *he did not see* the accordion freely suspended in air, which Mr. Crookes and the others by dint of straining under the table did see. Then again, the accordion was confessedly placed in Mr. Home's hands before it was placed in the cage under the table—this was certainly unnecessary and is very unsatisfactory. Then it is obvious that to play the accordion the keys must in turn have been depressed. Yet Mr. Crookes does not volunteer a single word to show that he noticed whether the keys were successively pressed down or not, in fact, he rather leads us to infer that they were not. Again, it is clearly a physical impossibility for the accordion to have gone round and round the cage if Mr. Home's hand was quite still, for if he held the accordion at all, his hands must have followed its movements, and what is there to show that the accordion moved his hand or his hand the accordion? Then again, as to the instrument chosen, would a concertina act in the same manner or not? for, from the frequency with which an accordion has been appealed to by "spiritual mediums," it has acquired anything but a good reputation. It is a pity we are not informed whether Mr. Home could in the moments when he is free from "psychic influence" play on the accordion or not, and also as to what were the names of "the simple air" and the "sweet and plaintive melody" which it so obligingly played. We are also not told either how long the experiment lasted, or how long the accordion was playing, or, what is much more to the point, how long it contravened all the laws of gravity and of the acoustics of wind instruments. Surely this is an important question, quite as important as that the temperature varied from 68° to 70° Fahr.

Such are some of the questions which arise with respect to the first experiment, and which must be answered before any reliance can be placed on the results attained.

There still remains the second experiment, which was of an entirely different kind: the one with the spring-balance. Mr. Crookes here says, "Mr. Home's fingers were never more than one-and-a-half inches from the extreme end, and the wooden foot being only one-and-a-half inches wide, and resting flat on the table, it is evident that no amount of pressure exerted in that space could produce any action on the balance;" and in this I quite agree; but did Mr. Crookes notice if the table itself *was moved at all?* From a very slight consideration of the peculiar apparatus employed, it is obvious that were the table to tip up in any so small a manner, the index of the balance must descend; and if the table was to tip up and down successively, the very same effect would be produced on the index of the balance as that which Mr. Crookes ascribes to "successive waves of psychic force." I do not say that the table was tipped up—that would have been trickery—but we have to account for certain results, and I do say that the tipping of the table would produce those very results, and that, moreover, there is nothing said about the table being immovable, or even heavy, or in any way fastened to the ground, as it most assuredly ought to have been. It does not appear so difficult to imagine that the "psychic force," which could produce such a strange effect upon an accordion could also so agitate the table that *it* also should show a tendency to move—and, if this were the case, the whole apparatus was so placed that the very slighest movements of the table would be magnified by the index of the balance.

On account of these and many other objections, I am forced to the conclusion previously stated, that these experiments were inaccurately performed—the details were not sufficiently examined, nor obvious errors apparently avoided, so that until they are repeated in the presence of other scientific men, they are not worthy of scientific consideration. We have read of the same phenomenon over and over again described as due to spiritual manifestations—many of them, as is well known, performed through the same agency—a medium—as those in this case. The British Association is about to meet. Let Mr. Crookes but repeat any one of the experiments at one of the evening *soirées*, and, if he can do this, he will make the Edinburgh Meeting for ever memorable, and will have earned for himself the undying reputation of having been the first to discover that in the midst of apparent humbug true science really and truly did exist.

J. P. EARWAKER

PROF. BALFOUR STEWART, in NATURE for July 27, does but scant justice to Mr. Crookes's investigations. "Allowing," he says, "that things of an extraordinary nature are frequently witnessed on such occasions" (he, no doubt, means to refer to the so-called Spiritualistic *séances*) "yet we are by no means sure that these constitute external realities." And he then goes on to suggest that the phenomena may occur rather in the imagination of the spectators than in the outside world; or that the mediums (though he won't give them that name) may be under some mental influence of an "electro-biological" nature. By the way it is a pity that any man of science should help in giving currency to such a quack-scientific word; if this unknown influence must have a name, Mesmerism is the most appropriate; that does not pretend to explain the cause of the phenomena, but only to commemorate their discoverer. Now in the experiments upon which Prof. Stewart comments (I presume he refers to those described in the current number of the *Quarterly Journal of Science*) there does not seem to have been much room for the exercise of the imagination of the spectators, nor for any "electro-biological" influence to act through the medium. Setting aside the accordion performances, which perhaps left a little scope for eye-deception, the results of the trial with the spring-balance were quite opposed to the known laws of mechanics. And certainly this trial took place under conditions which should have rendered deception impossible. The evidence of two such careful observers as Mr. Crookes and Dr. Huggins is not readily set down as a phantasm of their imagination; they are men accustomed to weigh the evidence of their senses with the utmost caution, for the slightest error therein would cause grave disturbance in their calculations. When such men testify that some mysterious force acted upon a lever in a way that no known force acts, and produced before their eyes results quite new to their experience, we should be as ready to believe them as if Dr. Huggins announced a new planet or Mr. Crookes a new metal; their testimony is as valuable in the one case as in the other. It is true that here they can only bear witness to the

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* *Vide* Mr. Home's St. Petersburg experiments.

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unknown, but the very existence of this unknown has hitherto been questioned. That when it is known this force shall be acknowledged to be a spiritual one is repugnant to all philosophy, and Serjeant Cox's haste to name it "psychic" is neither wise nor politic. Things spiritual have been materialised in the grossest manner by so-called spiritualists until the word has lost its meaning, and come to signify merely a cause unknown of phenomena sensual to the last degree. So it will be with "psychic" unless some one in authority stop this misuse of it at the very beginning.
GEORGE FRASER

Height of Auroras

I SAW the aurora of Sept. 3, 1870, described by H. C. Key on p. 121, and I observed it from 10 to 11 P.M., but here it never reached quite to the zenith, and at 11.2 P.M. was no where high. Its brightest feature was then a distinct arch, the apex of whose central line was 12° in altitude. If Mr. Key's description of the clear space of 7° or 8° below the aurora in the S.S.E., applies to that time, it would seem that the part of the aurora bordering the clear space cannot have been more than 25 miles above the earth, and was more likely only 17 or 18 miles.

It would be well if the heights of auroras were better known than they are; and I think if systematic observations were made simultaneously at different stations, our knowledge on the subject would be largely increased. I am willing to be one of the observers in such an investigation, and Mr. G. J. Symons, the editor of the *Meteorological Magazine*, has expressed his readiness to aid.
T. W. BACKHOUSE

Sunderland, July 22

Daylight Auroras

ON Sunday, the 23rd July, at 7.40 P.M., there was visible from Blackpool a phenomenon which might readily be mistaken for a daylight manifestation of the Aurora. The phenomenon in question consisted of a number of parallel streamers of light rising vertically and situated from the observer in a north-westerly direction. That portion of the sky occupied by these streamers would be about twenty-five degrees square, its lowest portion being about fifteen degrees above the horizon. At the time of the appearance the sun was obscured by a small but very dense cloud. Large masses of nimbus clouds occupied almost the whole of the north-western, northern, and north-eastern portion of the sky, whilst a few cumulus and cirro-cumulus clouds were visible in the eastern and southern parts of the heavens; one-twentieth part perhaps of the whole sky being apparently free from cloud. The streamers, which, like those of the Aurora, were intermittent in intensity, contrasted greatly in direction with any proximate beams of the sun. The whole thing, however, I am strongly of opinion, was nothing more than a meteorological phenomenon of a very different nature from the Aurora; in short, I believe it was an unusual appearance attendant on a distant and somewhat singularly circumstanced rainfall. Immediately above the uppermost boundary of the space occupied by the streamers there was a large nimbus cloud entirely obscured from the sun's direct rays, whilst that part of the sky occupied by the streamers themselves was in a strong sunshine. The whole phenomenon lasted about half an hour, and my opinion that it was but an unusual aspect of a distant rainfall was strengthened by the fact of a heavy shower of rain descending immediately after the disappearance of the streamers, the upper-current of the air being from the west by north. The rain-fall lasted about a quarter of an hour, and was accompanied by a double rainbow. When it had ceased that portion of the sky previously occupied by the streamers and almost half the remainder contained no visible trace of cloud.

This is the first instance in which I have seen what might be mistaken for a daylight manifestation of the Aurora. The streamers were so like those of the northern light, and the nature of the appearance nevertheless so obviously connected with a transient condition of the atmosphere, that I am very much tempted to doubt the visibility at any time of genuine Aurora by daylight.
D. WINSTANLEY

Manchester, July 24

Spectrum of the Aurora

HAVING noticed that Prof. Zöllner observed a *red line* in the spectrum of the aurora on October 25, 1870, and as it appears this was the first time the *red line* had been observed in Europe, I am induced to send you the following extract from a short paper read by me April 12, 1870, before the Royal Society of Victoria, on the great aurora of April 5, 1870:—

"The spectrum of the aurora was obtained with one of Mr. Browning's micro-spectroscopes. When the spectroscope was directed to the red streamers, a red line, more refrangible than C (hydrogen line), a greenish line about the position of the green calcium lines, and an indistinct band more refrangible still, which appeared as if resolvable into lines, were observed. When the spectroscope was directed to the green auroral arch, the red line disappeared, and only green ones remained; the rapid disappearance of the red line as the slit passed across the boundary between the base of the streamers and the green arch, was remarkable."

In this aurora there was the usual auroral cloud-like bank on the horizon (sea-horizon) surmounted by an arch of bright greenish light to an altitude of nearly 20°, terminating with a very defined margin, from which the red streamers sprung upwards as if from behind a screen, which shed enough light at midnight to read a newspaper by. This aurora was ushered in by great magnetic disturbances for days previously, which culminated about the time of the brightest display.
ROBERT J. ELLERY

Melbourne Observatory, May 19

Sparrow Cages

A PARAGRAPH in NATURE speaks of the export of sparrows to America. Such long low cages as are described at page 245, *covered with canvas*, may be seen at Leadenhall Market, in which very many thousands of Egyptian quails are brought to London alive and, I am told, disposed of as larks; of course not for the voice.
A. H.

July 27

BOOKS RECEIVED

ENGLISH.—Taine on Intelligence, part II.; translated by T. D. Haye (L. Reeve and Co.).—A Treatise on Terrestrial Magnetism (Blackwood).—Text-books of Science; Elements of Geometry: J. Watson (Longmans).—Domestic Botany: John Smith (L. Reeve and Co.).—Lighthouse Illumination: T. Stevenson, second edition: (A. and C. Black.)

PAMPHLETS RECEIVED.

ENGLISH.—On the Dermal and Visceral Structures of the Kagu, Sunbittern, and Boatbill: Dr. Murie.—Researches on the Anatomy of the Pinnipedia, part I.: Dr. Murie. Poisoning and Pilfering, Wholesale and Retail.—Journal of the Anthropological Institute, part I. March and April, 1871.—Transactions of the Manchester Geological Society, vols. 9—10.—Report of the Meteorological Committee of the Royal Society.—Journal of the Statistical Society, June.

AMERICAN.—On the Secular Perturbations of the Planets: A. Hall.—On the Application of Photography to the Determination of Astronomical Data A. Hall.—Equatorial Observations made at the U. S. National Observatory, Washington: A. Hall.—The School Laboratory of Physical Science, part II.: Prof. G. Hinrichs.

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